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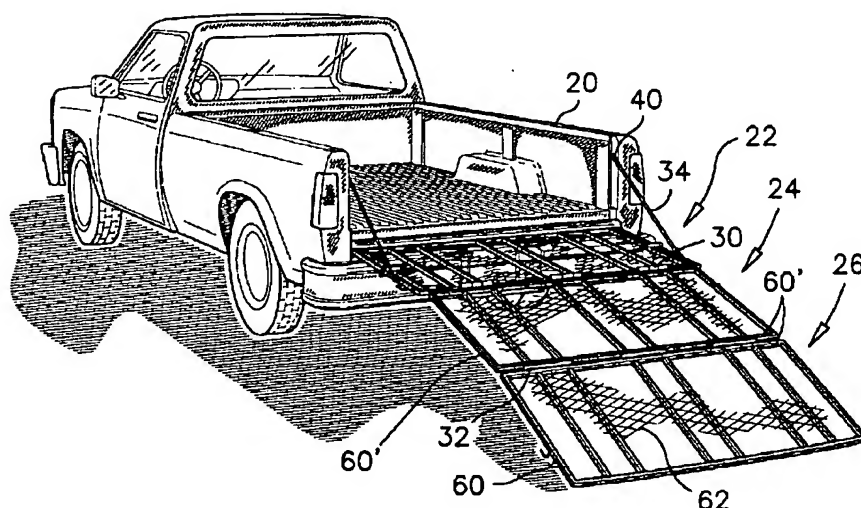
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(54) Titre : RAMPE DE HAYON REPLIABLE POUR CAMIONNETTES

(54) Title: FOLDABLE TAILGATE RAMP FOR PICKUP TRUCKS



(57) Abrégé/Abstract:

A foldable ramp having a first, second and third rectangular sections contiguous with each other and defining a ramp path having longitudinal and transverse axes. A first hinge group is affixed to both the first and second sections and a second hinge group is affixed to both the second and third sections. The first hinge group has a first axis of rotation on the upper side of the ramp path and extending across the longitudinal axis, and a first rotational range of slightly more than 180°. The second hinge group has a second axis of rotation on the under side of the ramp path and extending in a parallel alignment with the first axis of rotation, and a second rotational range of slightly less than 180°. The first and second hinge groups each have a central hinge and outside hinges, and stoppers on the central hinges to limit the rotation of the central hinges a few degrees less than the rotational range of the outside hinges. This configuration causes the ramp to arc longitudinally and transversely upwardly when deployed for increasing the moments of inertia of the ramp.

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**TITLE: FOLDABLE TAILGATE RAMP FOR PICKUP TRUCKS****FIELD OF THE INVENTION**

This invention pertains to tailgate ramps for pickup trucks, and more particularly, it pertains to a multiple-section foldable tailgate ramp that is positional to define arcuate configurations along the longitudinal  
5 and transversal axes thereof.

**BACKGROUND OF THE INVENTION**

Many types of foldable tailgate ramp systems have been used in the past. In most designs, the objective was to increase a deployed length and  
10 strength of the ramp without unduly increasing the size of its structural members. This objective remains a primary requirement to any acceptable foldable ramp concept.

For reference purposes, the foldable tailgate ramps of the prior art are believed to belong to three broad groups. The first group utilizes  
15 longitudinal beams for stiffening a ramp in use; the second group uses trusses or mid-span legs to strengthen the hinges between each section of the ramp, and the third group uses the abutting edges of adjoining panels for preventing the hinges from folding when the ramp is extended.

Examples of tailgate ramps of the first group wherein longitudinal  
20 beams are used to strengthen a ramp, are disclosed in the following patent documents:

US Patent **5,540,474** issued on Jul. 30, 1996 to Richard T. Holland,  
US Patent **5,752,800** issued on May 19, 1998 to Darryl Brincks et al.

In the first example, there is disclosed a tailgate ramp made in two sections that are hinged to one another. The ramp sections are constructed with marginal structural channel members and the panels are held in a planar alignment with each other by flat bars extending inside the channel members of both sections. In the second example, four ramp sections are maintained in a planar alignment with each other along an inclined path, by three support beams extending under the ramp, along the full length of the ramp.

In the second group of tailgate ramps of the prior art, the hinges are reinforced by inverted collapsible trusses mounted thereunder, or by foldable leg members extending from a mid-span portion of the ramp to the ground. Some examples of these designs are found in the following documents:

US Patent **3,976,209** issued on Aug. 24, 1976 to Edward E. Burton;  
US Patent **4,571,144** issued on Feb. 18, 1986 to Donald C. Guidry et al.;  
US Patent **4,795,304** issued on Jan. 3, 1989 to James D. Dudley;  
US Patent **4,944,546** issued on Jul. 31, 1990 to William K. Keller;  
US Patent **5,312,148** issued on May 17, 1994 to Alfred W. Morgan;  
US Patent **5,342,105** issued on Aug. 30, 1994 to Mark R. Miles;  
US Patent **5,791,717** issued on Aug. 11, 1998 to Terry Gene Reich et al.

In a third group of tailgate ramp systems, the rotation of the hinges between the panels and an associated sagging of the ramp under load are restricted by the abutment of the edges of adjoining panels, or by stopper

blocks acting upon the hinges. In this third group, the following examples are found.

US Patent **3,642,156** issued on Feb. 15, 1972 to Raymond A. Stenson;

US Patent **4,735,454** issued on Apr. 5, 1988 to John N. Bernard;

5 US Patent **5,133,584** issued on Jul. 28, 1992 to Dennis M. McCleary;

US Patent **5,156,432** issued on Oct. 20, 1992 to Dennis M. McCleary;

US Patent **5,273,335** issued on Dec. 28, 1993 to Philip Belnap et al.;

US Patent **5,287,579** issued on Feb. 22, 1994 to Orestes Estevez, Jr.

10           While it is generally known in the field of Mechanical Design that the stiffness of a structure is directly proportional to its moment of inertia, none of the above tailgate ramp systems has means for advantageously blocking the hinges between the panels of a tailgate ramp, for causing the ramp to arcuate upwardly when deployed, thereby increasing its moments  
15 of inertia. Although the tailgate ramps of the prior art deserve undeniable merits, there is no known prior art that suggests that a strategic blocking of the hinges between the panels of a foldable tailgate ramp can substantially increase the strength of this ramp.

## **SUMMARY OF THE INVENTION**

20           In the present invention, however, there is provided a foldable tailgate ramp for installation on a pickup truck, and which combines light weight with a remarkable strength.

          In accordance with one aspect of the present invention, there is provided a foldable ramp comprising a first, second and third rectangular  
25 sections contiguous with each other and defining a ramp path having an upper side, an under side, a longitudinal axis oriented between the first and

third sections, and a transversal dimension perpendicular to the longitudinal axis. The foldable ramp also has means for movably retaining and selectively steadying the first section thereof to a pickup truck.

5        There is also provided a first hinge group affixed to both the first and second sections for movably joining the first section to the second section. The first hinge group has a first rotational limit being defined by the positions of the first and second sections when the second section is laid against the first section. A second hinge group is affixed to both the second and third sections for movably joining the second section to the  
10       third section. The second hinge group has a second rotational limit being defined by the positions of the second and third sections when the third section is laid against the second section.

15       The first hinge group has a first axis of rotation on the upper side of the ramp path and extending across the longitudinal axis, and a first rotational range measured from the first rotational limit, of slightly more than  $180^{\circ}$ . The second hinge group has a second axis of rotation on the under side of the ramp path and extending in a parallel alignment with the first axis of rotation, and a second rotational range measured from the second rotational limit, of slightly less than  $180^{\circ}$ .

20       The principal advantage of this first aspect of the present invention is that the first, second and third sections are workable from a folded configuration wherein the first, second and third sections are laid over each other, to a deployed configuration wherein the ramp path is an upwardly arcuated pathway for stiffly supporting a vehicle moving thereon.

In accordance with another feature of the present invention, the first section is positional to make a reflex angle of between  $188^{\circ}$  to about  $190^{\circ}$  relative to the floor of a truck box, and the rotational ranges of the second and third sections are equivalent to the above reflex angle and to a mirror  
5 image of that reflex angle respectively. This feature has been found particularly advantageous for easily supporting a vehicle having a low undercarriage clearance.

In yet another feature of the present invention, there is provided a pair of link members which are connect-able between the first section and  
10 one of or both the second and third sections for retaining the second and third sections in a perpendicular alignment with the first section. Therefore, when the first section is held horizontally, and the second and third sections are held vertically by the link members, the foldable tailgate ramp is usable as a truck bed extension for supporting equipment longer  
15 than the truck's box.

In accordance with another feature, the first section of the foldable ramp has a round tubing with notches therein for pivotal connection to the tailgate attachment bosses on a pickup truck. Therefore, the foldable ramp is mountable to a pickup truck in replacement of a common tailgate.

20 In yet another feature of the present invention, the first hinge group comprises a pair of spaced-apart first outside hinges and a first central hinge disposed between the first outside hinges, and the second hinge group comprises a pair of spaced-apart second outside hinges and a second central hinge disposed between the second outside hinges. The first and  
25 second central hinges are disposed along the longitudinal axis of the ramp and the first and second outside hinges are disposed at a common distance from the longitudinal axis.

The first and second central hinges have stoppers for restricting a rotation thereof a few degrees less than a rotation of the first and second outside hinges respectively. Hence, when said ramp path is deployed, at least one of the sections is adapted to be arced transversely, and a moment  
5 of inertia thereof along the longitudinal axis is relatively increased.

In yet another feature, each section has a plurality of reinforcing members extending in a parallel alignment with the longitudinal axis, in coincidental alignment with the positions of the first and second central and outside hinges. These reinforcing members add longitudinal stiffness  
10 to each section, and to each hinge group when that hinged group is arced transversely.

In yet another aspect of the present invention, the third section of the ramp comprises an endmost transverse structural member relative to the ramp, and this endmost transverse structural member is arced away from  
15 the second hinge group for further promoting the aforesaid transverse arcing of the third section.

Still other features of the foldable ramp of the present invention comprises the fact that it is manufacturable with very light structural members relative to its supporting capacity. Accordingly, it is susceptible  
20 of a low cost of manufacture with regard to both materials and labour. It is then susceptible of low prices of sale to the consumer, thereby making such foldable ramp economically available to the public.

## BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of this invention is illustrated in the accompanying drawings, in which like numerals denote like parts throughout the several views, and in which:

5     **FIG. 1** is a perspective view of the tailgate ramp according to a preferred embodiment of the invention, mounted on a pickup truck;

**FIG. 2** illustrates a side view of the tailgate ramp according to the preferred embodiment;

10     **FIG. 3** is a side view of the tailgate ramp in a partially folded mode forming an extended truck bed;

**FIG. 4** is a side view of the tailgate ramp in a folded configuration;

**FIG. 5** is a plan view of the tailgate ramp according to the preferred embodiment;

15     **FIG. 6** is a detail of the latch mechanism of the tailgate ramp, as seen along **line 6** in **FIG. 5**;

**FIG. 7** is a cross-section view of a hinge comprised in the first hinge group;

**FIG. 8** is a cross-section view of a hinge comprised in the second hinge group;

**FIG. 9** is a cross-section view of an outside hinge in the first hinge group  
as seen along **line 9-9** in **FIG. 5**;

**FIG. 10** is a cross-section view of an outside hinge in the second hinge  
group, as seen along **line 10-10** in **FIG. 5**;

5     **FIG. 11** is a bottom view of an outside hinge in the first hinge group;

**FIG. 12** is a top view of an outside hinge in the second hinge group;

**FIG. 13** is a cross-section view of a central hinge in the first hinge group,  
as seen along **line 13-13** in **FIG. 5**;

10     **FIG. 14** is a cross-section view of a central hinge in the second hinge  
group, as seen along **line 14-14** in **FIG. 5**;

**FIG. 15** is another side view of the tailgate ramp according to the  
preferred embodiment, in a deployed mode;

**FIG. 16** is a cross-section view through the tailgate ramp along **line 16** in  
**FIG. 15**.

## 15     **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

While this invention is susceptible of embodiment in many different  
forms, there is shown in the drawings and will be described in details  
herein a specific embodiment, with the understanding that the present

disclosure is to be considered as an example of the principles of the invention and is not intended to limit the invention to the embodiment illustrated.

5 The foldable tailgate ramp of the preferred embodiment is illustrated in a fully deployed mode in the accompanying **FIGS. 1 and 2**. The tailgate ramp is mountable to a pickup truck **20** as a replacement of a common tailgate on the truck box. The ramp is usable for loading an all-terrain-vehicle, a motorcycle, a snowmobile, a lawn tractor or a vehicle or equipment of the like into the truck box. The foldable tailgate ramp of the  
10 preferred embodiment comprises a forward rectangular section **22**, an intermediate rectangular section **24** and a lower rectangular section **26**. The three sections are hinged to each other, and the forward section **22** is hinged to the pair of pivot bosses (not shown) normally used for mounting the common tailgate of the pickup truck **20**.

15 As can be seen in **FIG. 2**, the axis of the upper hinge group **30** between the forward and intermediate sections **22, 24**, is above the ramp, and the axis of the lower hinge group **32** between the intermediate section **24** and the lower section **26** is underneath the ramp. The foldable tailgate ramp of the preferred embodiment is thereby positional as to form an  
20 arcuate path along the length of the ramp as illustrated in **FIG. 2**. This feature will be explained later in greater details especially when making references to **FIGS. 7-16**.

The forward section **22** of the tailgate ramp is held in a horizontal or near a horizontal plane by means of a pair of tie straps **34** having each  
25 a hook **36** engaged into one of a pair of holed plates **38** affixed to the

forward section **22**. Each tie strap **34** is affixed to a pin **40** on the pickup truck box. The pins **40** are normally used for retaining linkages supporting a common tailgate.

Each holed plate **38**, which is better illustrated in **FIG. 5**, has a pair of holes therein. A forward hole **42** is used for receiving the hook **36** for holding the forward section **22** in a slight downward inclination as illustrated in **FIG. 2**. The rearward hole **44** is used for receiving the hook **36** for retaining the forward section **22** in a horizontal alignment as illustrated in **FIG. 3**.

The illustration in **FIG. 3** shows the tailgate ramp of the preferred embodiment in a partly folded mode. This configuration is particularly useful for increasing the length of a truck box for transporting equipment such as a snowmobile for example which normally has a longer span than the length of the truck box. In this configuration, the intermediate section **24** and the lower section **26** are held in a vertical alignment by means of a pair of link bars **50** connected to the forward section **22**. A first link bar **50** is connected to a first pin **52** on the lower section **26**, and a second link bar **50'** is connected to a second pin **52'** on the intermediate section **24** for retaining both the intermediate section **24** and the lower section **26** against one-another. The second link bar **50'** and the second pin **52'** are illustrated in **FIG. 5**.

Referring back to **FIG. 4**, the three sections of the tailgate ramp of the preferred embodiment are foldable in a vertical arrangement as illustrated therein when not used. When the tailgate ramp is stowed in this manner, the lower section **26** and the intermediate section **24** are preferably

held against one-another by a U-shaped bolt **54** engaged in a pair of sockets **56, 56'**, one on each section **24, 26**. The sockets **56, 56'** are illustrated in **FIG. 5**.

5 The three sections **22, 24** and **26** are framed with hollow structural steel (HSS) members **60**, and are covered with expanded metal grating **62**. The preferred size of HSS members **60** is 3/4 inch by 3/4 inch by 1/8 inch. The preferred size of expanded metal grating **62** is 3/4 inch by 13-gauge. This structure is advantageous for its light weight, its ease of manufacturing and for its low air resistance when stowed in the vertical position.

10

Referring now to **FIGS. 5** and **6**, the tailgate ramp of the preferred embodiment is lockable in the vertical stowed position by a pair of latch bolt assemblies **70** affixed to the forward section **22** of the ramp. Each latch bolt assembly **70** comprises a rectangular bolt **72** mounted in a rectangular sleeve **74**. The sleeve **74** is affixed transversely to a pair of framing members **60**. On the inside end of the bolt **72** relative to the forward section **22**, there is provided a L-shaped bracket **76** to which a cable **78** is attached. A pair of springs **80** are connected to the L-shaped bracket **76** and to the grating **62** of the section **22**, for pulling the latch bolt

15

20 **72** outwardly relative to the forward section **22**. A further guide plate **82** is affixed to the L-shaped bracket **76** and defines with the latch bolt **72** a space for enclosing the latch pin **84** along the rear vertical edge of the truck box, which pin is normally used for latching a common tailgate. The cable **78** preferably extends across the forward section **22** between the two

latch bolt assemblies **70**. Thus, the operation of both latch bolt assemblies **70** is simultaneously effected by pulling on the cable **78** in a direction perpendicular to the plane of the forward section **22**.

5 The upper hinge group **30** comprises three equally-spaced-apart hinges; a pair of outside hinges **30'** and a central hinge **30''**. Similarly, the lower hinge group **32** comprises a pair of outside hinges **32'** and a central hinge **32''**. The structure of each section comprises a pair of longitudinal reinforcing members **90** extending longitudinally relative to the length of the ramp, within each section and in alignment with corresponding outside  
10 hinges **30'**, **32'**. A further pair of longitudinal reinforcing members **90'** is provided along a longitudinal central region of each section. The reinforcing members **90** and **90'** strengthen each section against bending stress in a direction along the length of the ramp when the ramp is being used. The reinforcing members **90**, **90'** also strengthen the transverse  
15 members of each section against torsional stresses caused by the blocking of the hinges as will be explained later. The preferred type and dimensions of the reinforcing members **90**, **90'** are HSS, 3/4 inch by 3/4 inch by 1/8 inch.

20 The forward framing member **94** of the forward section **22** is a round tubing having an outside diameter of about 1-5/8 inch. Both ends of the tubing **94** are notched for mounting on the pivot bosses (not shown) of a pickup truck box as is customary with a common tailgate.

25 Referring now to **FIGS. 7 to 16**, there is illustrated therein the arrangement of the hinge groups for causing the tailgate ramp of the preferred embodiment to uphold an upward curvature and thereby to

maintain higher moments of inertia. Each hinge in the upper hinge group 30 comprises a pair of flat bars 100 each being welded to a set of spaced-apart cylindrical sleeves 102. The sleeves welded to one flat bar are interposed between the sleeves welded to the other flat bar in a manner which is common to hinges. Similarly, each hinge in the lower hinge group 32 is made of a pair of flat bars 100' and cylindrical sleeves 102'. The pin 108 in each hinge is preferably a round bar having a diameter of about 5/8 of an inch. The cylindrical sleeves preferably have an outside diameter of about 7/8 of an inch. The length of engagement of the cylindrical sleeve over the round bar 108 is preferably about 7 inches. Other preferred dimensions for the hinges are that the flat bars 100 on the upper hinges 30 have a thickness of 1/4 inch, a width of 1 inch and a length of about 10 inches. The flat bars 100' on the lower hinges 32 preferably have a thickness of 3/8 of an inch, a width of 1 inch and a length of about 10 inches.

The hinges 30, 32 are affixed to each section using nominal 1/4 inch machine bolts 110. Referring particularly to FIGS. 9 and 11, the bolts 110 used for retaining the upper hinge 30 to the forward and intermediate sections 22, 24 are staggered relative to one-another such that the bolt head 112 of one bolt does not come in contact with the bolt head 112' of an opposite bolt when the ramp is unfolded.

The spacing 'A' between the flat bars 100 of the upper hinges 30, 30' when these flat bars are parallel to one another is slightly more than the thickness of the bolt head 112. The spacing 'A' is preferably sufficient for allowing a rotation of the intermediate section 24 relative to the forward

section 22 of between about  $185^{\circ}$  to about  $195^{\circ}$ , when the bolt head 112 through one flat bar of an outside hinge 30' abut against the opposing flat bar 100 of that hinge.

Referring now particularly to FIGS. 10 and 12, the bolts 114, 114' retaining the lower hinge group 32 to the intermediate and lower sections 24, 26 are aligned with one-another such that the bolt heads 116, 116' in opposed flat bars abut against each other when the tailgate ramp is fully deployed. The spacing 'B' between the opposite flat bars 100' of a lower hinge 32, 32' when these flat bars 100' are parallel to each other is slightly less than twice the thickness of a bolt head 112. The spacing 'B' is preferably sufficient for restricting the rotation of the lower section relative to the intermediate section to between about  $168^{\circ}$  and about  $172^{\circ}$ , when the opposite bolt heads 116, 116' on the outside hinges 32' abut against one another.

According to the above limitations of the upper and lower hinge groups, the tailgate ramp of the preferred embodiment is preferably unfolded such that the forward section 22 has an inclination 'C' as shown in FIG. 15, from an horizontal plane, of between about  $8^{\circ}$  to about  $10^{\circ}$ . The intermediate section 24 preferably has an inclination 'D' of about  $8^{\circ}$  to about  $10^{\circ}$  relative to the alignment of the forward section 22. The lower section 26 preferably has an inclination 'E' of between about  $8^{\circ}$  to about  $10^{\circ}$  relative to the alignment of the intermediate section 24.

The arcuate path defined by inclination of each section of the tailgate ramp as illustrated in FIG. 15 is particularly advantageous for loading equipment having a low undercarriage clearance, such as a large motorcycle or a tractor having a lawnmower mounted thereunder. The

arcuate path defined by each section is further advantageous for increasing the moment of inertia of the longitudinal cross-section of the ramp and consequently for stiffening the ramp transversely.

5 Referring back particularly to **FIGS. 13 and 14**, the central upper hinge **30"** and the central lower hinge **32"** have washers **120, 120'** under the bolt heads **112, 116** of the bolts retaining these hinges to the respective sections. The preferred thickness of each washer is about between 0.020 inch to about 0.080 inch. The purpose of these washers **120, 120'** under  
 10 the bolt heads on the bolts of the central hinges **30"**, **32"** is to restrict the rotation of these hinges a few degrees less than the previously-stated rotational range of the outside hinges **30'** and **32'** respectively. When the tailgate ramp of the preferred embodiment is extended and loaded, the aforesaid blocking of the central hinges causes the central region of the  
 15 tailgate ramp to remain higher than the side portions. In this respect and for reference purposes, a preferred median dimension of a transverse curvature of the ramp when the ramp is loaded, as shown as label 'F' in **FIG. 16** is between about 1/8 of an inch to about 1/2 of an inch.

Therefore, when the ramp is loaded, the moment of inertia of a  
 20 transverse cross-section of the ramp is substantially larger than the moment of inertia of a comparative flat cross-section having the same dimensions. The longitudinal strength of the ramp of the preferred embodiment is thereby increased accordingly.

Furthermore, the blocking of the central hinges **30"**, **32"** causes the  
 25 transverse framing members **60'** between each section to twist under load. The blocking of the central hinges and the twisting of the transverse framing members **60'** also cause the central longitudinal reinforcing

members 90' to flex when a load is carried on the ramp. Normally, without such blocking of the central hinges, these members would contribute very little strength to the supporting of a wide load such as an all-terrain-vehicle for example. In the normal case, the major part of the weight of the all-terrain-vehicle would be supported mainly by the longitudinal side members 60 and the longitudinal reinforcing members 90 along both sides of the ramp. The blocking of the central hinges as taught above contributes to pre-stressing the transverse members 60' and the longitudinal central reinforcing members 90' such that a load moving on the ramp is distributed across the entire ramp structure.

In order to further cause the ramp to initially flex transversely for increasing the moment of inertia of its transverse cross-section, the endmost member 130 of the lower ramp section 26 is preferably curved outwardly by a dimension of between about 1/4 of an inch to about one inch as indicated by label 'G' in FIG. 5. When the ramp is deployed, the lower section 26 is resting against a flat surface and a four-wheeled vehicle for example is moved over the lower section 26 of the ramp, the weight of the vehicle causes the side portions of the ramp to flex downwardly relative to the central longitudinal region, thus adding to the transverse curvature 'F' and increasing the longitudinal strength of the ramp.

The tailgate ramp of the preferred embodiment is therefore substantially stronger than a comparable flat structure. The additional strength is obtained by an advantageous placement and configuration of the hinges, and the shape of the bottom member 130. The additional strength is obtained without adding significant material or fabrication cost to the ramp as compared with the flat structures of the ramps of the prior art.

As to the manner of usage and operation of the tailgate ramp of the preferred embodiment, the same should be apparent from the above description, and accordingly any further discussion related to the manner of usage and operation would be considered redundant and is not provided.

5

While one embodiment of the present invention has been illustrated in the accompanying drawings and described hereinabove, it will be appreciated by those skilled in the art that various modifications, alternate constructions and equivalents may be employed without departing from the true spirit and scope of the invention. Therefore, the above description and the illustrations should not be construed as limiting the scope of the invention which is defined by the appended claims.

10

## CLAIMS

I claim:

1. A foldable tailgate ramp for installation on a pickup truck, comprising:
  - a first, second and third rectangular sections contiguous with each other and defining a ramp path having an upper side, an under side, and longitudinal and transverse dimensions;
  - means for movably retaining and selectively steadying said first rectangular section to a pickup truck;
  - a first hinge group affixed to both said first and second rectangular sections for movably joining said first rectangular section to said second rectangular section;
  - a second hinge group affixed to both said second and third rectangular sections for movably joining said second rectangular section to said third rectangular section;
  - said first hinge group having a first axis of articulation on said upper side and extending along said transverse dimension, and means for allowing an articulation thereof over a first articulation range of more than  $180^{\circ}$ ;
  - said second hinge group having a second axis of articulation on said under side and extending in a parallel alignment with said first axis of articulation, and means for restricting an articulation thereof within a second articulation range of less than  $180^{\circ}$ ; and

said third rectangular section having a planar configuration and an endmost transverse structural member, and said endmost transverse structural member being arced with a central segment thereof away from said second hinge group within a plane of said planar configuration;

such that said first, second and third rectangular sections are workable to form an upwardly arcuate pathway for easily and stiffly supporting a load moving thereon.

2. The foldable tailgate ramp as claimed in **claim 1**, wherein said first articulation range is between 185 degrees and 195 degrees, and said second articulation range is between 168 degrees and 172 degrees.
3. The foldable tailgate ramp as claimed in **claim 1**, wherein said means for movably retaining and selectively steadying said first rectangular section to a pickup truck comprises means for aligning said first rectangular section along a reflex angle relative to a horizontal plane.
4. The foldable tailgate ramp as claimed in **claim 3**, wherein said reflex angle is between 188 degrees and 190 degrees.
5. The foldable tailgate ramp as claimed in **claim 3**, wherein said means for aligning said first rectangular section also comprises adjustment means for adjusting said reflex angle.
6. The foldable tailgate ramp as claimed in **claim 5**, wherein said adjustment means is a pair of holed plates and a pair of strap members connect-able to said holed plates and to a pickup truck.

7. The foldable tailgate ramp as claimed in **claim 1**, wherein said first rectangular section comprises link members connect-able to one of said second and third rectangular sections for retaining said second and third rectangular sections in a perpendicular alignment therewith.
8. The foldable tailgate ramp as claimed in **claim 1**, wherein said first hinge group comprises a pair of spaced-apart first outside hinges and a first central hinge disposed between said first outside hinges, and said second hinge group comprises a pair of spaced-apart second outside hinges and a second central hinge disposed between said second outside hinges, and said first and second central hinges being disposed at a common distance from said first and second outside hinges respectively.
9. The foldable tailgate ramp as claimed in **claim 8**, wherein each of said first, second and third rectangular sections comprises reinforcing members extending in coincidental alignment with positions of said first and second central and outside hinges.
10. The foldable tailgate ramp as claimed in **claim 1**, wherein said means for movably retaining and selectively steadying said first rectangular section to a pickup truck comprises a round tubing having means for pivotal connection thereof to a pickup truck.

11. A foldable tailgate ramp for installation on a pickup truck, comprising:
- a first, second and third rectangular sections contiguous with each other and defining a ramp path having an upper side, an under side, and longitudinal and transverse dimensions;
  - means for movably retaining and selectively steadying said first rectangular section to a pickup truck;
  - a first hinge group affixed to both said first and second rectangular sections for movably joining said first rectangular section to said second rectangular section;
  - a second hinge group affixed to both said second and third rectangular sections for movably joining said second rectangular section to said third rectangular section;
  - said first hinge group having a first axis of articulation on said upper side and extending along said transverse dimension and a first articulation range of more than  $180^{\circ}$ ;
  - said first hinge group comprising a pair of spaced-apart first outside hinges and a first central hinge disposed between said first outside hinges;
  - said second hinge group having a second axis of articulation on said under side and extending in a parallel alignment with said first axis of articulation, and a second articulation range of less than  $180^{\circ}$ ;
  - said second hinge group comprising a pair of spaced-apart second outside hinges and a second central hinge disposed between said second outside hinges;
  - said first and second central hinges being disposed at a common distance from said first and second outside hinges respectively;

each of said first and second central hinges having a hinge blocking means for restricting an articulation thereof relative to said first and second outside hinges respectively;  
such that said first, second and third rectangular sections are workable to form a longitudinally and transversely upwardly arced pathway for easily and stiffly supporting a load moving thereon.

12. The foldable tailgate ramp as claimed in **claim 11**, wherein each of said first, second and third rectangular sections comprises spaced-apart transverse framing members defining a respective length thereof, and said hinges are affixed to said transverse framing members by bolts.
13. The foldable tailgate ramp as claimed in **claim 12**, wherein said hinge blocking means comprises said bolts, and bolt heads abutting against each other.
14. The foldable tailgate ramp as claimed in **claim 13**, wherein said hinge blocking means also comprises washers on said bolts.
15. The foldable tailgate ramp as claimed in **claim 11**, wherein said third rectangular section has a planar configuration and an endmost transverse structural member, and said endmost transverse structural member is arced with a central segment thereof away from said second hinge group within a plane of said planar configuration.

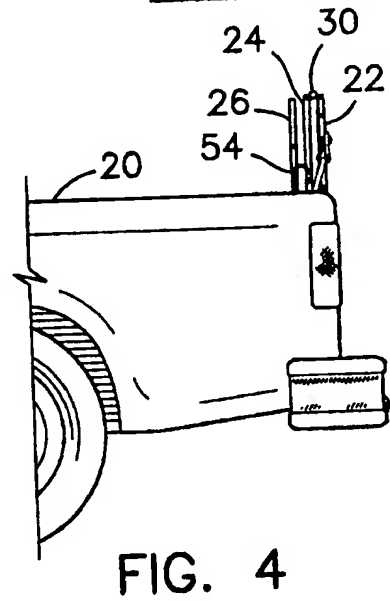
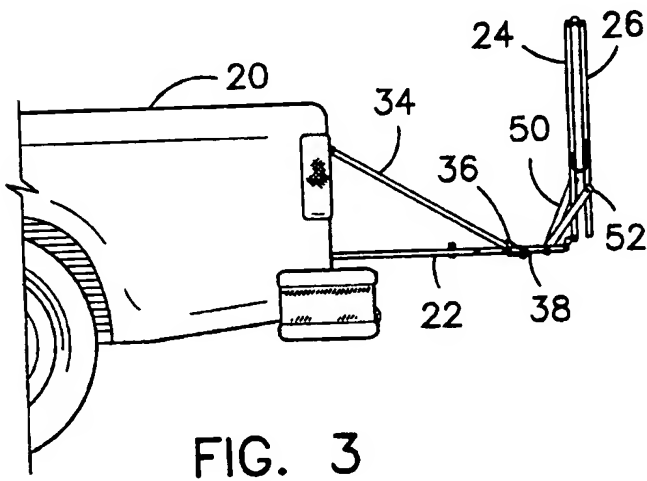
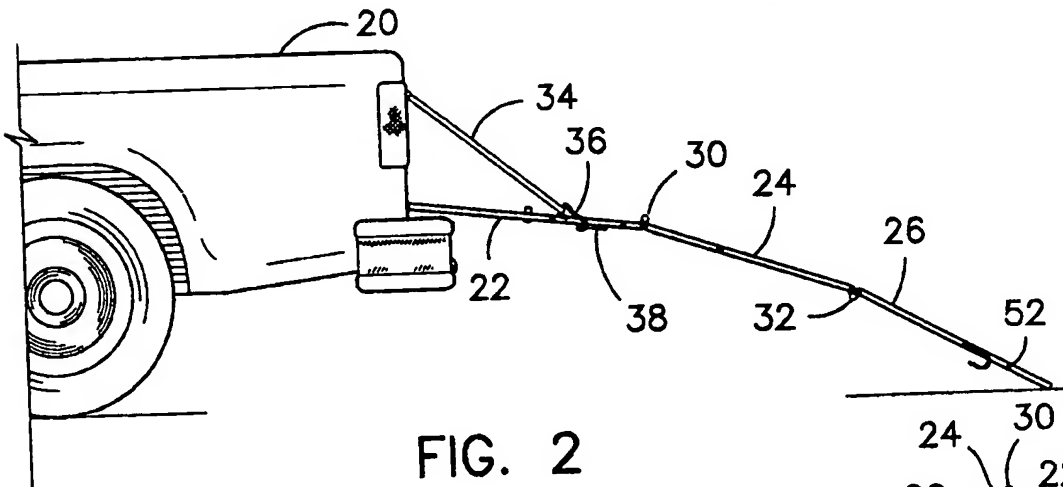
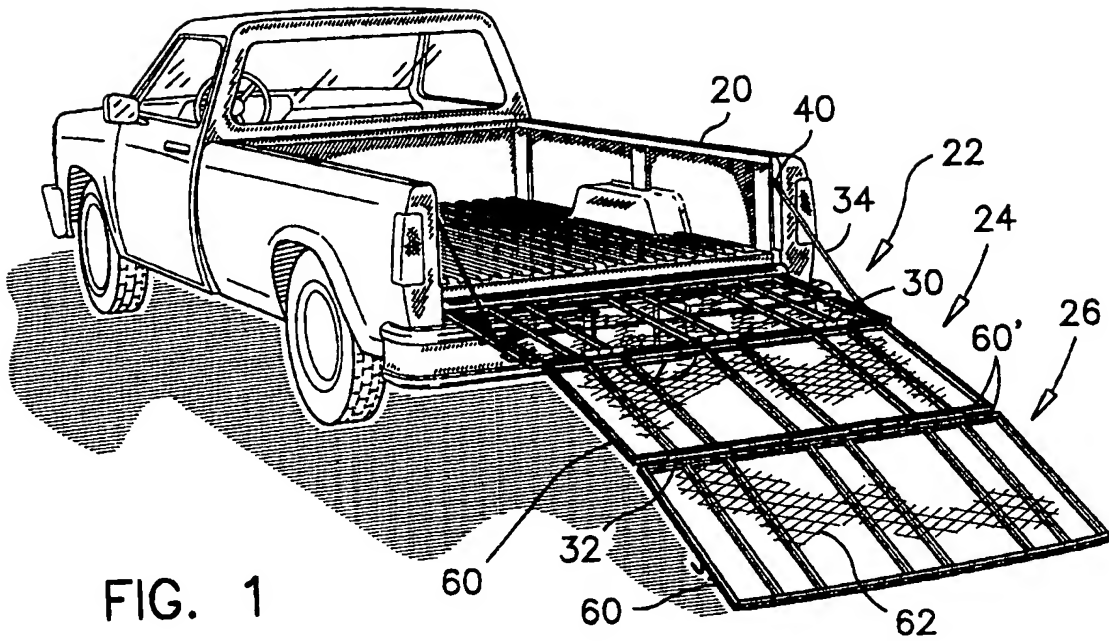
16. The foldable tailgate ramp as claimed in **claim 15**, wherein a depth of a curvature of said endmost transverse structural member is between one quarter of an inch to one inch.
17. A foldable ramp for moving equipment thereon and comprising:
  - a plurality of juxtaposed rectangular sections defining a ramp path having longitudinal and transverse dimensions;
  - said plurality of rectangular sections comprising a first, second and third juxtaposed rectangular sections;
  - a first hinge group affixed to both said first and second rectangular sections for movably joining said first rectangular section to said second rectangular section,
  - a second hinge group affixed to both said second and third rectangular sections for movably joining said second rectangular section to said third rectangular section, and
  - said third rectangular section comprising an endmost transverse structural member spaced apart and arced with a central segment thereof away from said second hinge group,such that said third rectangular section is transversely arcuately formative for increasing a moment of inertia thereof.
18. The foldable ramp as claimed in **claim 17**, wherein said second hinge group further comprises means for upwardly arcing at least one of said second and third rectangular sections along said transverse dimension.
19. The foldable ramp as claimed in **claim 18**, wherein said means for upwardly arcing at least one of said second and third rectangular sections comprises means for arcing said rectangular section over a height of between 1/8 inch to 1/2 inch.

- 20.** The foldable tailgate ramp as claimed in **claim 17**, wherein said first rectangular section comprises link members connect-able to one of said second and third rectangular sections for retaining said second and third rectangular sections in a perpendicular alignment therewith.

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**TITLE: FOLDABLE TAILGATE RAMP FOR PICKUP TRUCKS****ABSTRACT OF THE DISCLOSURE**

A foldable ramp having a first, second and third rectangular sections contiguous with each other and defining a ramp path having longitudinal and transverse axes. A first hinge group is affixed to both the first and second sections and a second hinge group is affixed to both the second and third sections. The first hinge group has a first axis of rotation on the upper side of the ramp path and extending across the longitudinal axis, and a first rotational range of slightly more than  $180^{\circ}$ . The second hinge group has a second axis of rotation on the under side of the ramp path and extending in a parallel alignment with the first axis of rotation, and a second rotational range of slightly less than  $180^{\circ}$ . The first and second hinge groups each have a central hinge and outside hinges, and stoppers on the central hinges to limit the rotation of the central hinges a few degrees less than the rotational range of the outside hinges. This configuration causes the ramp to arc longitudinally and transversely upwardly when deployed for increasing the moments of inertia of the ramp.



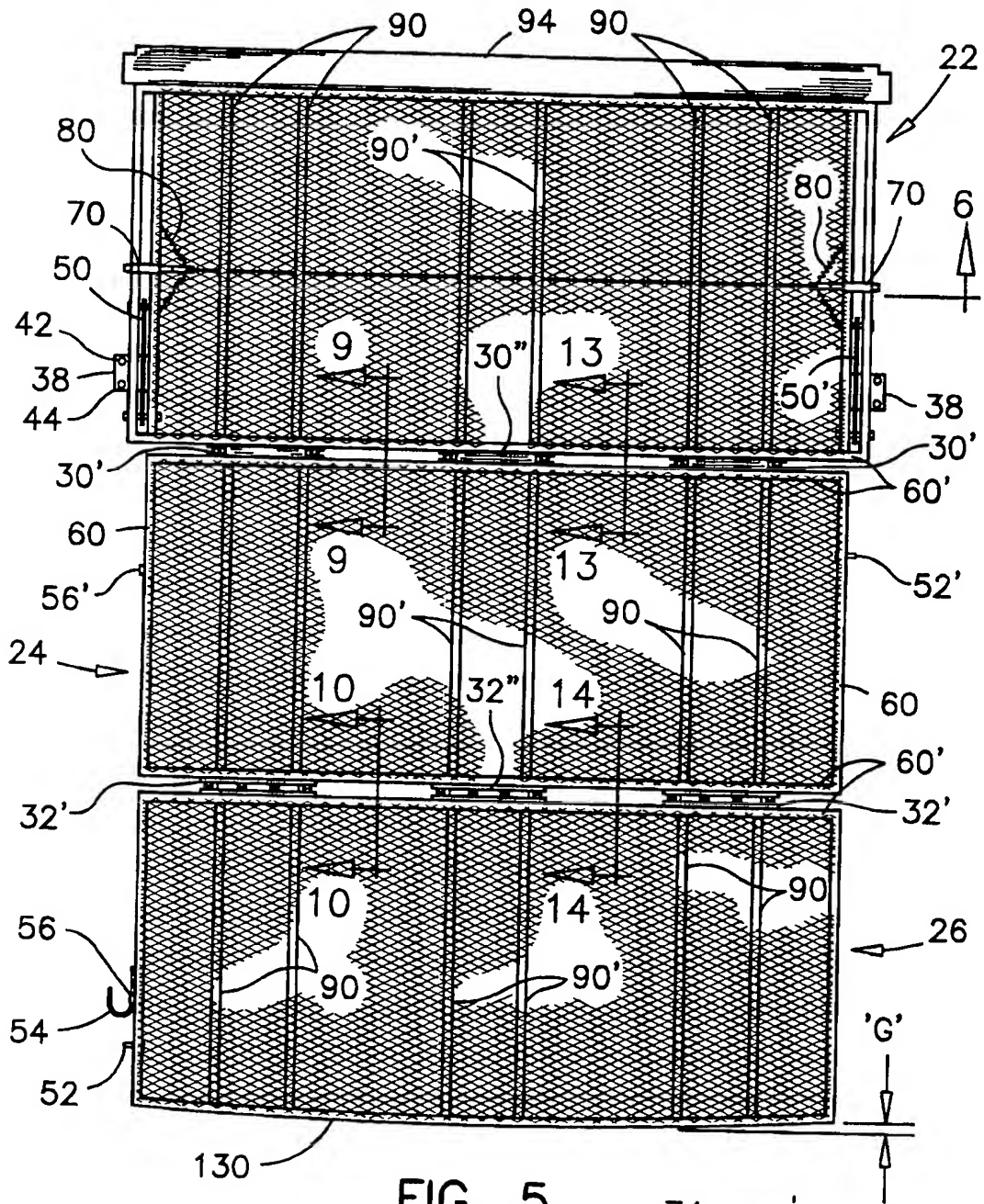


FIG. 5

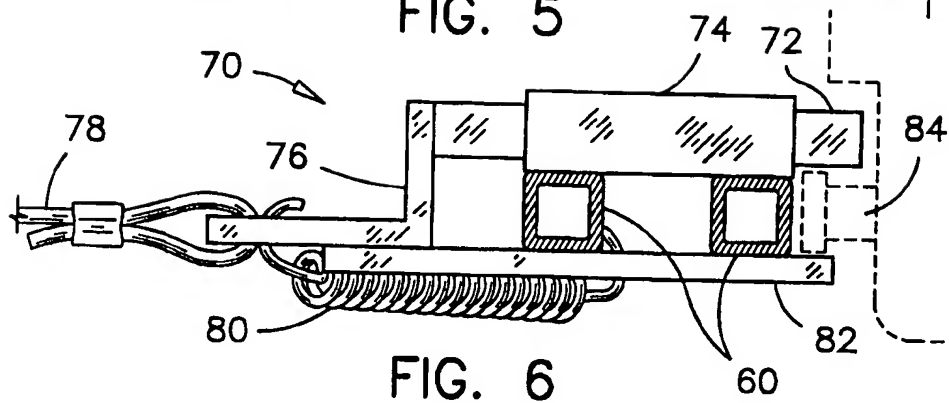
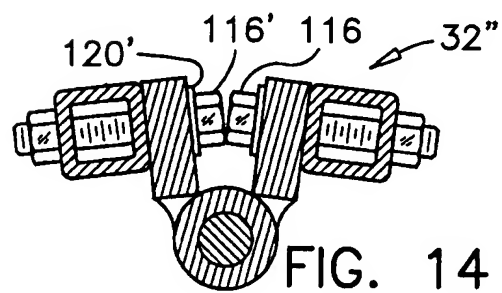
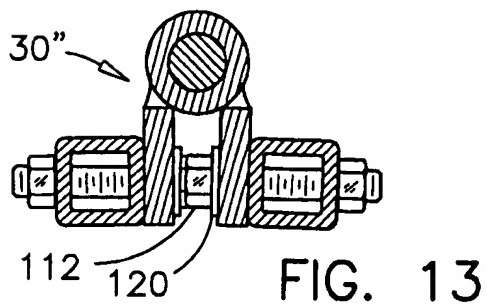
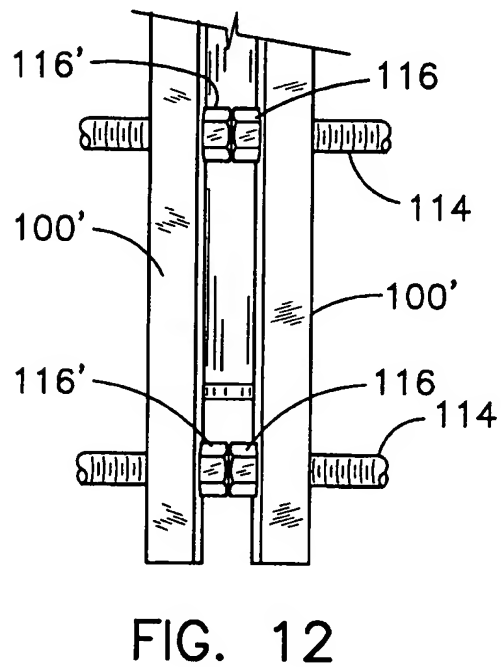
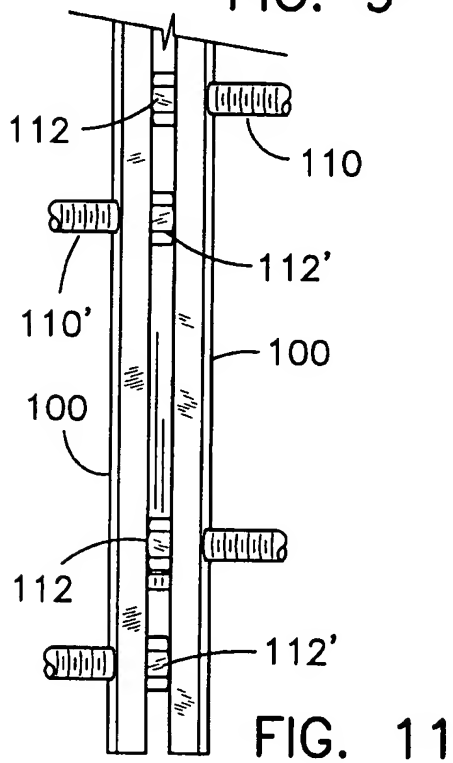
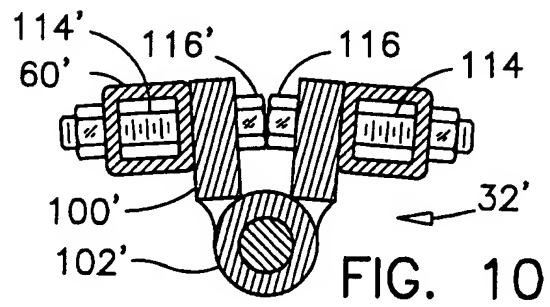
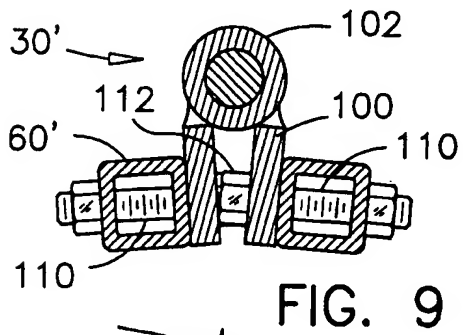
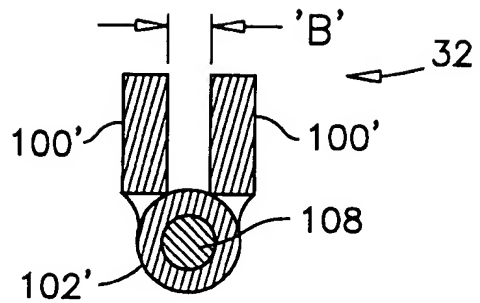
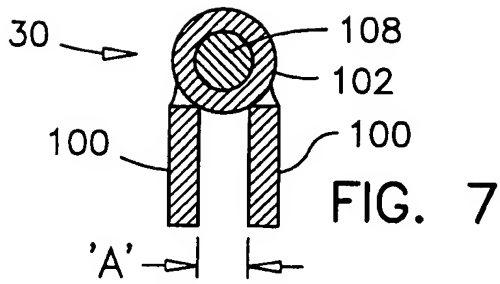


FIG. 6



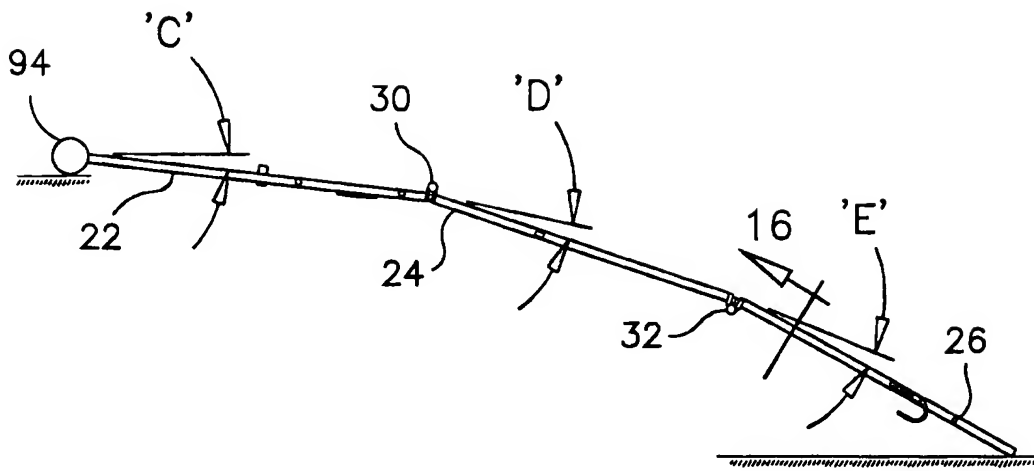


FIG. 15

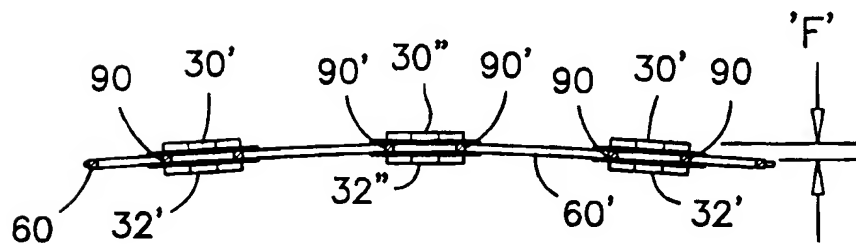


FIG. 16

